

CW#60H: Solve Right Triangles  
Honors Geometry

Teacher Notes – KEY

CRS	FUN 502 Express sine, cosine, and tangent of an angle in a right triangle as a ratio of given side lengths
Objective	10.5 Solve right triangles a. given the angle measure and one side length of a right triangle, find the side length of the triangle, and b. given the length of the two sides of a right triangle use trigonometric ratio to find an angle measure

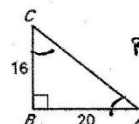
REVIEW!

SOH	CAH	TOA
Sine = $\frac{\text{opp}}{\text{hyp}}$	Cosine = $\frac{\text{adj}}{\text{hyp}}$	Tangent = $\frac{\text{opp}}{\text{adj}}$

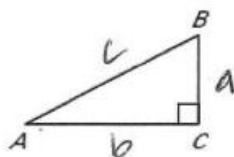
What we learned before only allows us to solve for the missing side of a right triangle using the trig ratios SIN, COS or TAN.

So, how do we find the  $m\angle C$  or  $m\angle A$  in the triangle to the right?

The answer? inverse trig functions!



Pythag =  $AC = 25.6$



Inverse Tangent	If $\tan A = \frac{a}{b}$ , then $\tan^{-1} \frac{a}{b} = m\angle A$
Inverse Sine	If $\sin A = \frac{a}{c}$ , then $\sin^{-1} \frac{a}{c} = m\angle A$
Inverse Cosine	If $\cos A = \frac{b}{c}$ , then $\cos^{-1} \frac{b}{c} = m\angle A$

**Example 1:** Let  $\angle A$  be an acute angle in a right triangle. Approximate the measure of  $\angle A$  to the nearest tenth of a degree.

a.  $\sin A = 0.45$

$26.7^\circ$

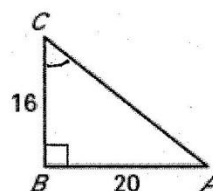
b.  $\tan A = 0.9$

$42^\circ$

c.  $\cos A = 0.3$

$72.5^\circ$

**Example 2:** To the nearest tenth of a degree, use a calculator to approximate



a.  $m\angle A$   $38.6^\circ$

b.  $m\angle C$

$\tan^{-1}(20/16) = 51.3^\circ$

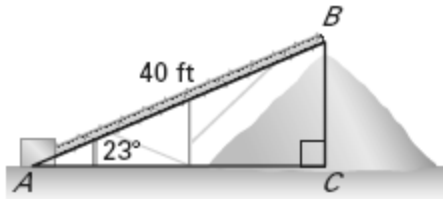
Converting from Degrees to Radians: 1 degree =  $\pi/180$  and 1 radian =  $180/\pi$  degrees

either  $\times \frac{\pi}{180}$  or  $\frac{180}{\pi}$

Ans for Challenge: 4. (7.39, 3.06), (5.66, 5.66), (3.06, 7.39), (0, 8)

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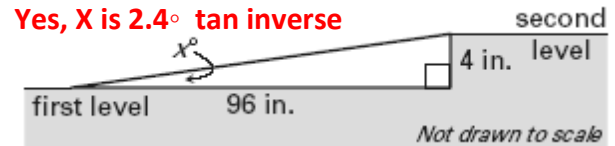
1. Solve the triangle. (Find all missing sides and angles).  
Round decimal answers to the nearest tenth.



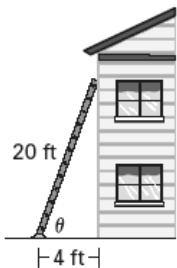
**$BC = 15.6 \text{ ft. (sin } 23^\circ)$        $\angle B = 67^\circ \text{ (sin inverse)}$**

**$AC = 36.8 \text{ ft. (cos } 23^\circ)$**

2. You are building a track for a model train. You want the track to incline from the first level to the second level, 4 inches higher, in 96 inches. Is the angle of elevation less than  $3^\circ$ ?



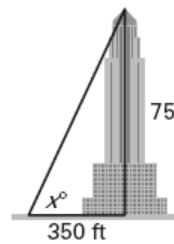
3. You lean a 20 foot ladder against a wall. The base of the ladder is 4 feet from the wall. What angle  $\theta$  does the ladder make with the ground?



**$\text{Theta} = 78^\circ$**

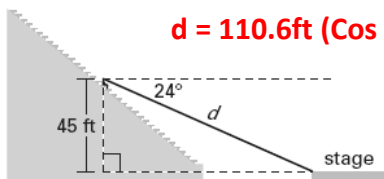
**Tan inverse**

4. You are standing 350 feet away from a skyscraper that is 750 feet tall. What is the angle of elevation from you to the top of the building?



**$\angle x = 65^\circ$  tan inverse**

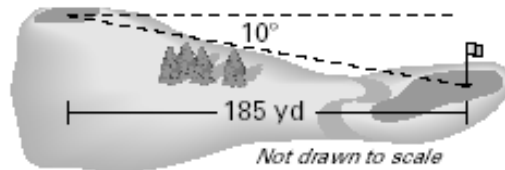
5. You attend a music concert with some friends and sit halfway up the bleachers in the arena. The angle of depression from your horizontal line of sight to the stage is  $24^\circ$ . If your seat is 45 feet above stage level, what is your actual distance  $d$  from the stage? Round to the nearest foot.



**$d = 110.6 \text{ ft (Cos } 66^\circ)$**

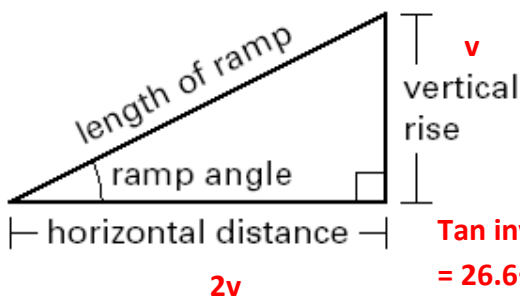
nearest foot.

6. The angle of depression from the tee box to the green is  $10^\circ$  on a par 3, 185 yard hole. How much higher is the tee box than the green? Round to the nearest yard.



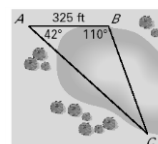
**$X = 33 \text{ yds (tan } 10^\circ)$**

7. You are designing a ramp where the horizontal distance is twice as long as the vertical rise. What will be the ramp angle to the nearest tenth of a degree?



**Tan inverse of  $(1/2)$   
 $= 26.6^\circ$**

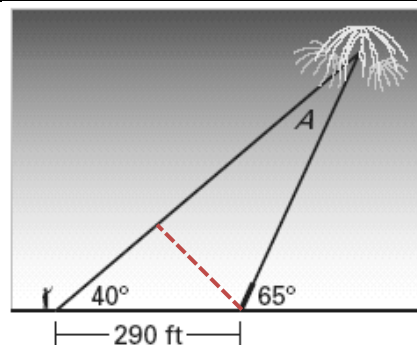
8. A surveyor needs to find the distance  $BC$  across a lake as part of a project to build a bridge. The distance from point  $A$  to point  $B$  is 325 feet. The measurement of angle  $A$  is  $42^\circ$  and the measurement of angle  $B$  is  $110^\circ$ . What is the distance  $BC$  across the lake to the nearest foot?



**Bisect  $AC$  to make 2  
right triangles.**

**$BC = 463 \text{ ft.}$**

9. You are watching a fireworks display where you are standing 290 feet behind the launch pad. The launch tubes are aimed directly away from you at an angle of  $65^\circ$  with the ground. The angle of elevation for you to see the fireworks is  $40^\circ$ .



a. To the nearest foot, what is the horizontal distance from the launch pad to the ignition point of the fireworks?

$$\cos 40 = \frac{x}{290}$$

$$x = 222.2$$

$$\cos 65 = \frac{222.2}{x}$$

$$x = 525.8$$

b. To the nearest foot, what is the height of the fireworks when they ignite?

$$\sin 65 = \frac{x}{525.8}$$

$$x = 476 \text{ ft}$$

c. What is the measure of angle A

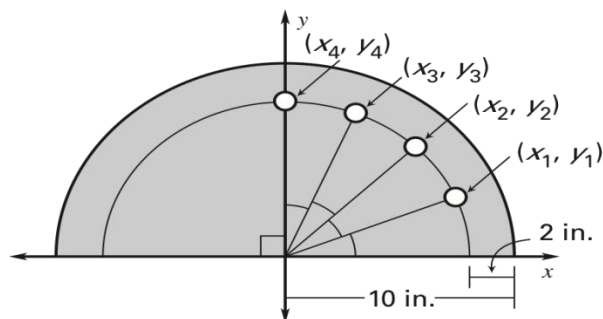
$$180 - 65 = 115^\circ$$

$$180 - 40 - 115 = m\angle A = 25^\circ$$

**Machine Part** A machine part is in the shape of a half-circle with a radius of 10 inches. Small holes are drilled as shown in the figure. Find the coordinates of each hole.

*From x-axis to y-axis*

4. (7.39, 3.06), (5.66, 5.66), (3.06, 7.39), (0, 8)



**Conversions:**

10) Convert each angle in degrees to radians.

$$\times \frac{\pi}{180}$$

a)  $60^\circ$  b)  $150^\circ$  c)  $-45^\circ$  d)  $90^\circ$  e)  $107^\circ$

$$\frac{\pi}{3} \quad \frac{5\pi}{6} \quad \frac{-\pi}{4} \quad \frac{\pi}{2} \quad \frac{107\pi}{180}$$

11) Convert each angle in radians to degrees.

$$\times \frac{\pi}{180}$$

a)  $\frac{\pi}{6}$  radians b)  $\frac{3\pi}{2}$  radians c)  $-\frac{3\pi}{4}$  radians

d)  $\frac{7\pi}{3}$  radians e) 3 radians

$30^\circ$   $270^\circ$   $-135^\circ$   $420^\circ$   $171.9^\circ$